DEBUNKING THE MERCURY MYTH

The Rationale for Removal of Mercury Containing Restorations

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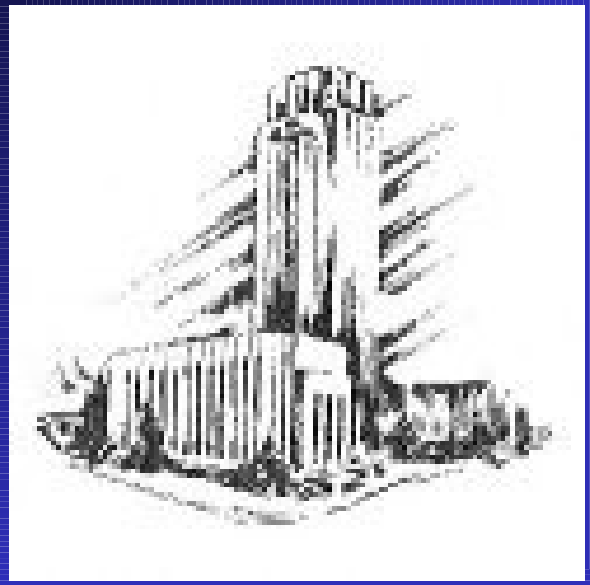
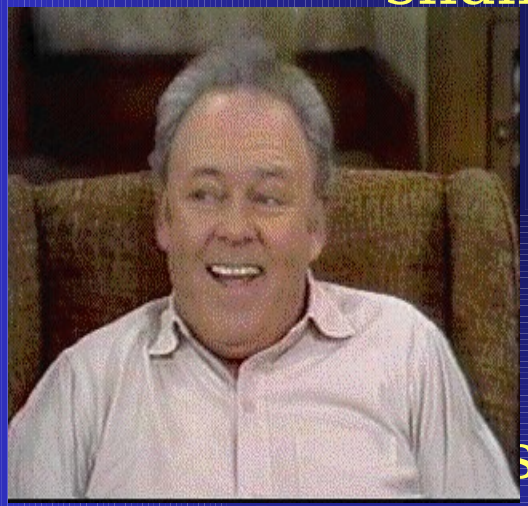


DEBUNKING

The Debunker:

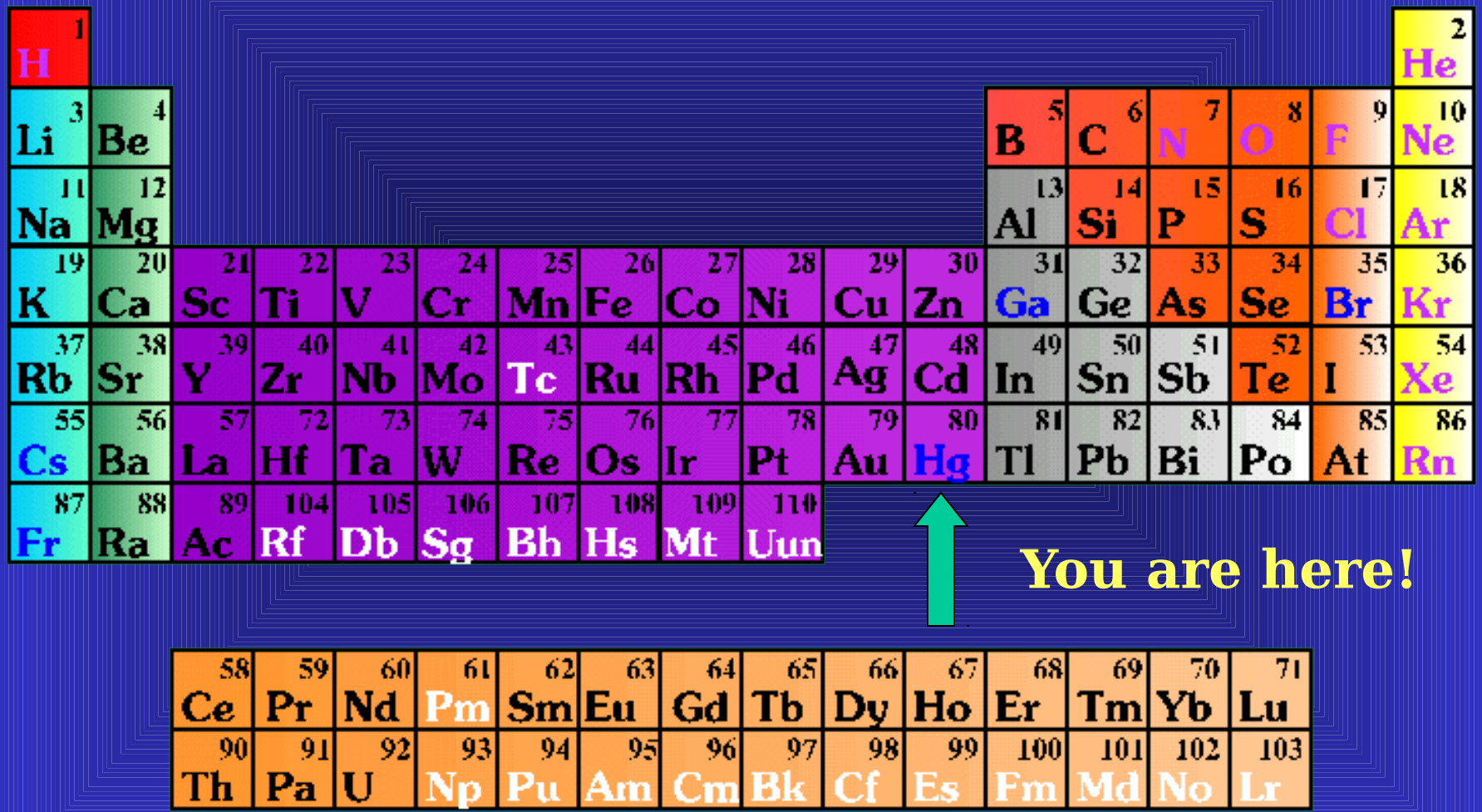
One who exposes or ridicules the falseness, sham, or exaggeration of claims



s a poison that is respon

diverse symptoms of impaired health and disease states

ITS ELEMENTARY

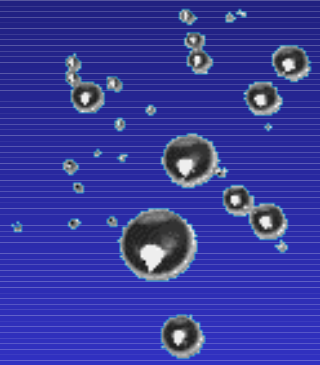


MERCURY (Hg)

- Atomic Number = 80
- Atomic Mass = 200.59
- Group = Transition Met
- Melting Point = -38.87°
- Boiling Point = 356.58°
- Only metal to exist as a silvery liquid at room temperature (*Quicksilver*)

MERCURY USES

- Barometers
- Thermometers
- Electric Switches
- Fluorescent Lamps
- Batteries
- Insecticides
- Rat poisons
- Disinfectants
- Plastics
- Dental Amalgam



DENTAL AMALGAM

- Dentistry accounts for 4% of overall Hg use
- Silver (Ag) - 40-70%
- Tin (Sn) - 17-30%
- Copper (Cu) - 2-40%
- (Zn) - 0-2%, (In) - 0-5%, (Pd) - 0-1%
- Mercury (Hg) - 42-51%

THE REACTION

- Low Copper Alloys

AgSn + Hg >>> AgSn + AgHg + SnHg

γ γ_1 γ_2

- High Copper Alloys

AgSnCu + Hg >>> AgSnCu + AgHg + CuSn

γ γ_1

THE PARTICLES

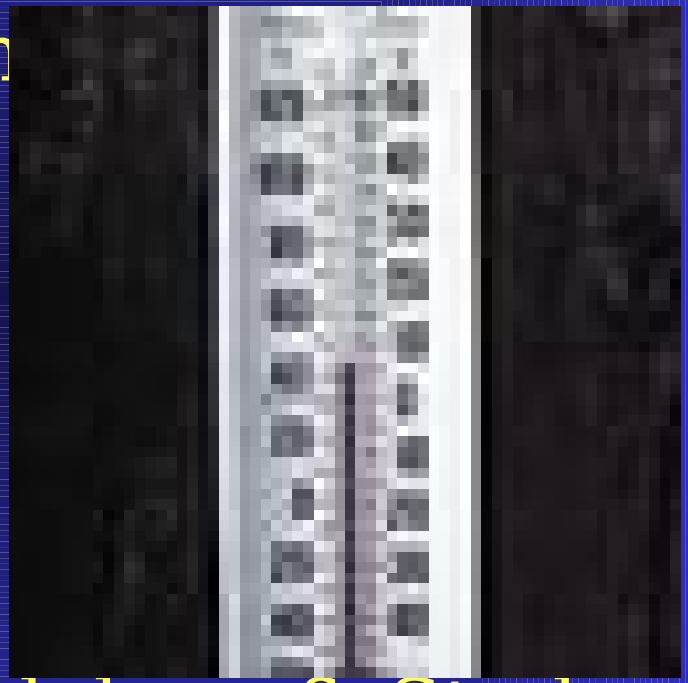
- Lathe-cut (Irregular)
  - Cracked particles
  - Requires more mercury to wet particles
  - More than 50% Hg
- Spherical
  - Smooth particles
  - Requires less mercury to wet particles
  - Less than 50% Hg

AMALGAM COMPOSITION

- Low Copper Alloys
  - Irregular = 53% Hg
  - Spherical = 46-48% Hg
- High Copper Alloys
  - Spherical (Unicompositional) = 43-46%
  - Irregular and Spherical (Admixed) = 50%
- Indium Interest (*Indisperse*)
  - Decreases the amount of Hg and Hg vapor

THE CONTROVERSEY

- Hg in Dental Amalgan
- Hg Exposure
  - Patients
  - Providers
  - Public
- Hg Effects
- Hg Measuring Methodology & Study

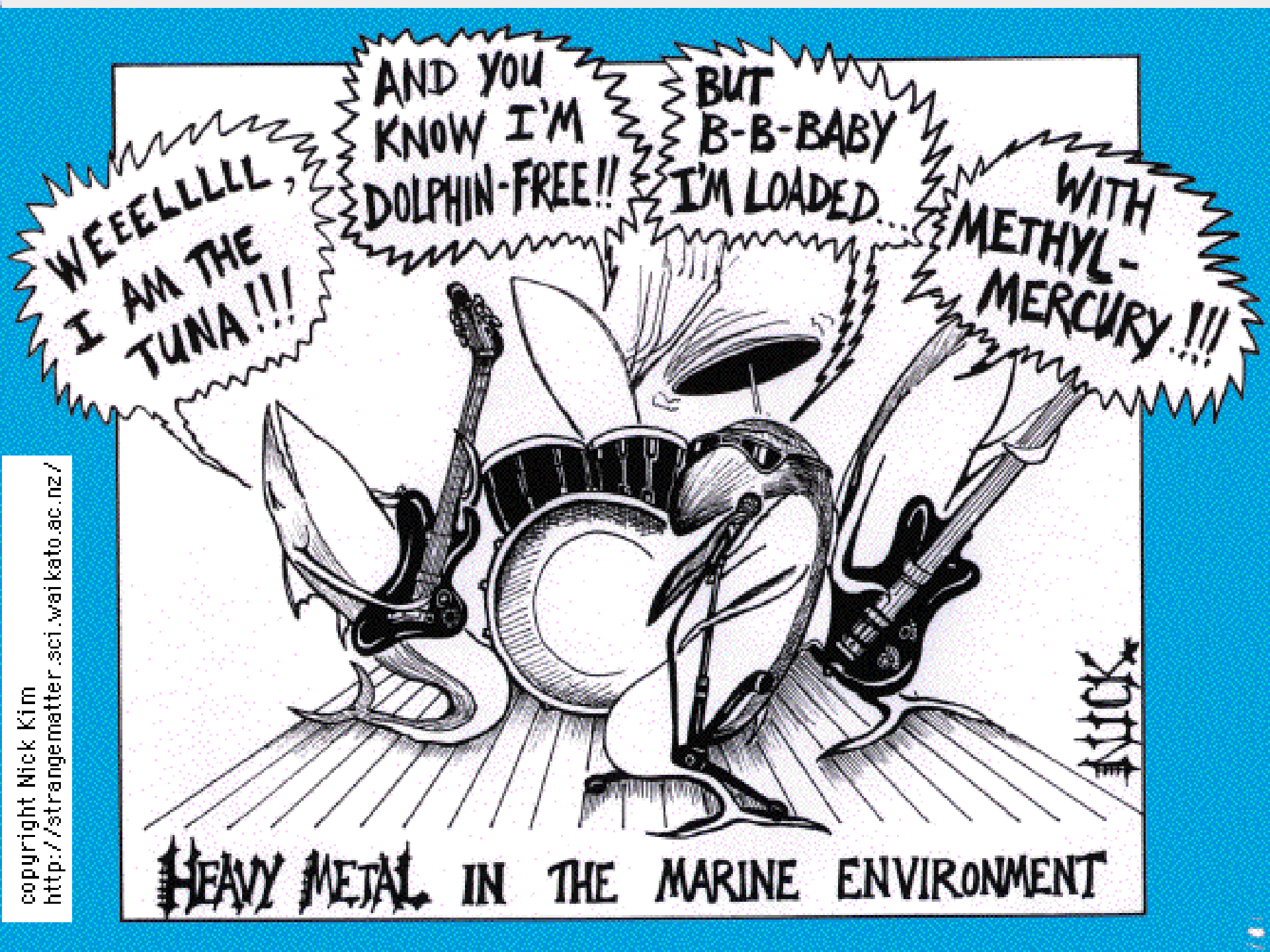


RUB-A-DUB-DUB?

MAD AS A HATTER

FORMS OF MERCURY

- Metallic - Hg - Stable/Unreactive
- Ionic - Hg^{+} - Reactive/Not a HazMat
- Salts - HgCl - Mercuric Chloride
- Compounds - Amalgam
- Methyl Hg - Reacted Toxic Form/Poison
- Vapor - Detectable?



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PATIENT EXPOSURE

- Amalgam Fillings
  - New
  - Replaced
    - 50% due to recurrent caries
    - Recurrent caries reported at 5% (13-14 years)!
  - Mastication

- Mercury Vapor
  - Consider refinishing or repairing
  - Replacement not indicated

ANTI-AMALGAM CLAIMS

- Neurotoxicity
- Renal Dysfunction
- Birth Defects
- Arthritis
- Multiple Sclerosis
- Chronic Fatigue Syndrome
- Candida Infection
- Antibiotic Effects
- Hodgkin's Disease
- Mononucleosis
- Depression
- Ulcers
- Epilepsy
- Etc, Etc, Etc…

SENSATIONALIZATION

- 1985 *Huggins DDS* “It’s All In Your Head”
- 1990 *60 Minutes* “Poison In Your Mouth”
- 1990 *Univ of Calgary* “Sheep Study”
- 1993 - 1997 Various Reports
- 1997 *Richardson Report* “Assessment of Mercury Exposure and Risks”

SCIENTIFIC FACTS

- High levels of Hg do produce toxic effects
- Hg vapor is minute/undetectable
- Blood Hg increases upon removal of amalgam
- Dental personnel have greatest exposure without evidence of decreased health
- True hypersensitivity to amalgam = allergic reactions or lichenoid lesions

PROVIDER EXPOSURE

- Mercury Vapor
- Amalgam Handli
  - Storage
  - Disposal
- Amalgam Use
  - Type
  - Frequency
- Mercury Spill

Hg TESTING

- Hg urinary levels dropping in providers 1985 = 5.8μg Hg/L>>1995 = 4.9μg Hg/L
  - Compliance with Precautions
  - Dispensing of Amalgam (Capsules)
  - Competition with Direct Esthetic Restoratives
- Ambient air concentrations
  - Amalgam Vapor
  - Fungicides and other chemicals

MSDS

- High temperature increases vaporization
- Avoid contact with Halogens, Nitric Acid
- Chronic Hg poisoning results in irritability, weakness, tremor, gingivitis, & erethism
- Carcinogenicity - None

SAFE HANDLING

- Hg Spill Protocol (Sweep, Sulfur, Salts)
- Disposal IAW F, S, & L Regulations
- Store in closed containers in well ventilated cool places away from high temperatures
- Avoid inhalation of vapors/ingestion
- Wear protective clothing, safety glasses, rubber gloves, & mask

ADA RECOMMENDATIONS

- Training
- Identify Sources
- Ventilate Spaces
- Monitor Air/Urine
- Spillproof Office
- Precapsulated Alloy
- Avoid Hg contact
- Proper disposal
- HVE Suction
- Storage/Salvage
- Recycle
- Comply with Regs
- Clean up spills
- Professional clothing

PUBLIC EXPOSURE

- Amalgam Sources
- Amalgam Procedure
  - Scrap/Carvings/Sucti
  - Grindings/Teeth/
  - Instruments/Drain
- Regulated Solid Was
- Not Hazardous Mate

AMALGAM GRINDINGS

- Particulate Matter
- Waste Water
- Environmental Contamination
- EPA Tests (1µg/L)
  - $Hg + HNO_3 >>>$ Measurable Hg^+
- Separators
  - Filtration/Sedimentation/Centrifuge

AMALGAM RESTRICTIONS

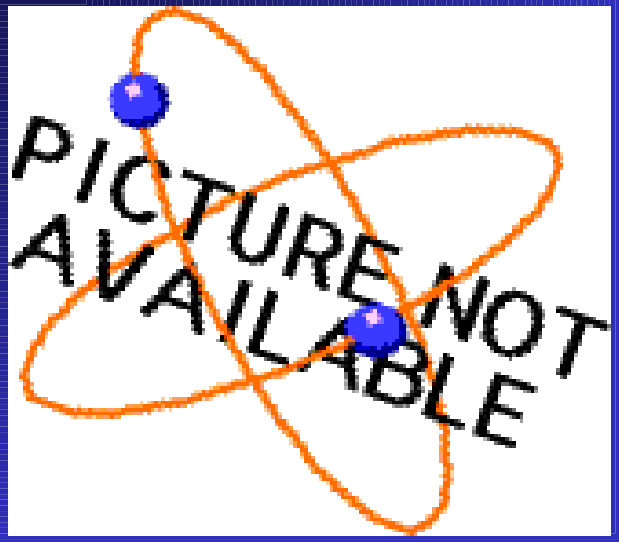
- None in the United States
- Sweden, Denmark, and Germany have proposed restrictions on amalgam use
- The intent is to reduce the environmental release of Hg, it is not due to amalgam restoration danger.
- Environmental concerns may limit our usage, not the “mercury poisoning” of our patients.

AMALGAM ALTERNATIVES

- Composite Resin Restoratives (8 years)
  - ADV=Marketable & Esthetic
  - DISADV=Shrinkage & Durability
- Gold (15+Years)
- Porcelain (?)
- Gallium Alloys (2-3 years)

GALLIUM ALLOYS

- No Hg
- Increased surface corrosion
- Increased marginal breakdown
- Increased expansion
- Crack/Fracture

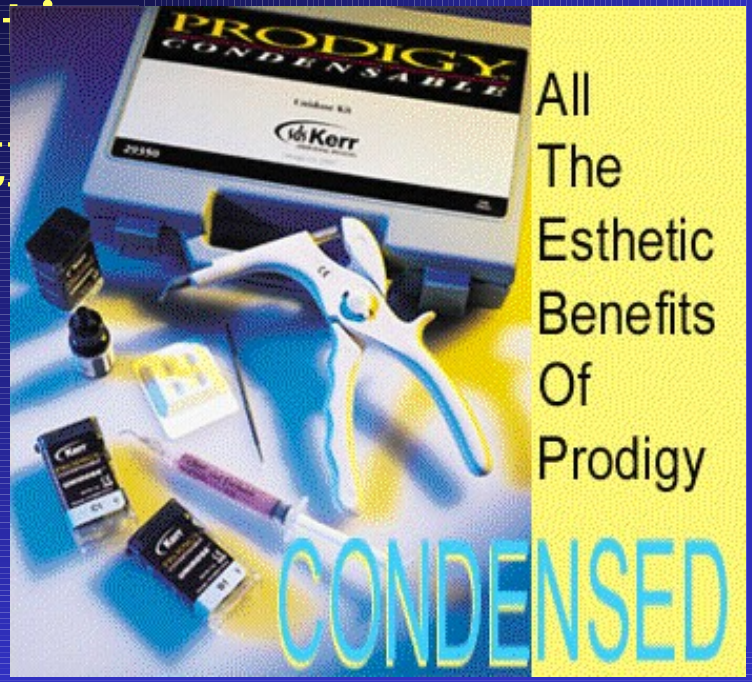


UNDER STUDY

- Pressure Compounds
  - Require 500-900 MPa (Smisson = 30-50 MPa)
  - Cu + W >> Intermetallic Compound
  - Ag + Sn >> Alternative AgSn Compound
- Consolidated Silver Compounds
  - Ag powder + Fluoroboric Acid/Pressure >> Ag Mass (Eichmiller, NIST) “Cold-welding”
  - Slow Consolidation/High Contamination

POST-AMALGAM AGE?

- Foreign Countries
- U.S Decline 85-58% (1988-1997)
- Alternative Restora
- Sensationalized Pat

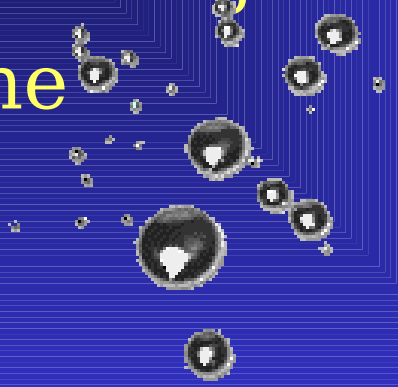


ETHICS

- Unless new and compelling evidence is presented to the contrary, dentists cannot ethically tell patients that dental amalgam is a health hazard or that removal of amalgam restorations will benefit their health.
- When clinical research demonstrates that tooth-colored restoratives are as economical and effective in the long-term as dental amalgam, switch.

CONCLUSIONS

- Continue to use amalgam unless esthetics is a concern
- Use conservative preparations
- Use resin sealants for non-carious fissures
- Monitor research on bonded amalgams
- Practice safe mercury hygiene
- Stay informed!



QUOTE OF THE WEEK…

“Thanks for the gumball Paul!”